

REMARKS

In view of the following remarks, reconsideration of the rejections contained in the Office Action of November 19, 2001 is respectfully requested.

The Examiner has rejected claims 12-20 and 22-28 as being unpatentable over the Ohshita reference (USP 5,156,099) in view of the Hirayama reference (USP 5,620,488). However, as discussed below, these prior art rejections are traversed. In addition, new claims 29 and 30, having a slightly different scope, have now been added. For the reasons discussed below, it is respectfully submitted that claims 12-20, 22-28, and new claims 29 and 30 are clearly patentable over the prior art of record.

The present invention is directed to a two-stage fluidized-bed gasification method and apparatus in which *combustible gas* is generated at a controlled temperature in a first stage of the combustion system, and then delivered to an adjacent melt combustion furnace for combustion in the second stage of the combustion system. As explained in detail in the specification, control of the temperature at which the combustible gas is generated is important in order to stabilize the gasification of the combustible waste products poured into the fluidized-bed furnace, and also to prevent damage to the fluidized-bed furnace due to extreme temperatures. Thus, the present invention provides an apparatus in which the temperature of the fluidized-bed furnace can be efficiently controlled, even if waste products having non-uniform calorific values are processed.

As explained above, the first stage of the combustion system of the present invention involves generating a *combustible gas* at a controlled temperature. The specification describes this combustible gas as a gas produced by *incomplete* combustion of materials as opposed to, for example, *exhaust gas* which is produced when materials are *completely* combusted (see page 3, lines 10-21 of the specification). The present application provides one example of the present invention with reference to Figure 1 (a discussion of which will now be made to aid the Examiner's understanding without any intention of limiting the scope of protection to this specific example). In particular, combustible material enters a fluidized-bed furnace 102 through a supply port 66. The combustible material F is heated by the fluidized medium, and volatile particles of the combustible material F are gasified. As explained on page 12, line 25 through page 13, line 2, because there is

very little or no oxygen available when the volatile particles are gasified, a generated *combustible gas* composed of the gasified volatile particles *is not combusted*, and flows upward (as indicated by arrow 116) and out of the fluidized-bed furnace through gas outlet 68 (as indicated by arrow 29). This combustible gas is **then** combusted along with non-combusted particles from the fluidized-bed furnace in a melt combustion furnace 41.

In particular, independent method claims 20 and 25 are directed to a method of treating combustibles, including gasifying combustibles in a combustion region within a fluidized-bed furnace so as to generate combustible gas and non-combusted particles. Furthermore, these method claims recite that the combustible gas and non-combusted particles are delivered to a melt-combustion furnace and combusted therein. Similarly, independent apparatus claims 24, 27 and 29 are directed to an apparatus for treating combustibles, including a fluidized-bed furnace having a region for gasifying combustibles so as to generate combustible gas and non-combusted particles. The apparatus further comprises a melt combustion furnace for receiving and combusting the combustible gas and the non-combusted particles.

In rejecting the claims as being unpatentable over the Ohshita reference in view of the Hirayama reference, the Examiner asserts that the Ohshita reference discloses a fluidized-bed furnace comprising a combustion region 3 for generating a combustible gas and particles as recited in column 7, lines 58-67. However, the Ohshita reference discloses a fluidized-bed boiler in which coal or waste materials are **completely** combusted in a fluidized bed. In particular, column 7, lines 50-53 explains that "even coal with a high fuel ratio can be completely burnt." Furthermore, column 7, lines 58-67 cited by the Examiner explains that this *complete* combustion generates exhaust gas, rather than *combustible gas* as in the present invention. Thus, it is submitted that the Ohshita reference does not disclose or suggest gasifying combustibles in a fluidized-bed furnace so as to generate *combustible gas* and non-combusted particles. See Fig. 10

The Examiner further asserts that the Hirayama reference discloses a fluidized-bed combustion apparatus similar to the Ohshita reference, including a heat recovery region for generating gases and fine particles. The Examiner further asserts that it would have been obvious to one of ordinary skill in the art "to send the gas and particles generated by the apparatus of Ohshita" into a melt combustion

furnace disclosed in the Hirayama reference because the same products (gas and particles) can be used in an economic fashion to drive a gas turbine. However, as explained above, the gas produced in the furnace of the Ohshita reference is *exhaust gas* generated by *complete* combustion. Therefore, it is not possible to deliver *combustible gas* from the Ohshita reference (since there is not combustible gas generated) to the Hirayama reference as suggested by the Examiner. As a result, a large amount of auxiliary fuel is required in the Hirayama reference in order to produce molten slag.

The Examiner is also requested to note that the gas turbine disclosed in the Hirayama reference downstream of the melt combustion furnace comprises an expansion turbine for recovery of energy by expanding exhaust gas, rather than by combusting combustible gas. In addition, the Hirayama reference does not disclose or suggest any heat recovery surface in the fluidized-bed furnace. *not claimed*

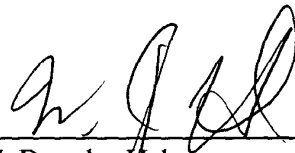
As explained above, the Ohshita reference and the Hirayama reference do not, either alone or in combination, disclose or suggest a method of treating combustibles or an apparatus for treating combustibles, utilizing a two stage combustion system in which combustibles are gasified to generate a *combustible gas*, and the combustible gas is delivered to a melt combustion furnace for combustion. Therefore, one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention recited in independent claims 20, 24, 25, 27 and 29. Accordingly, it is respectfully submitted that claims 12-20 and 22-30 are clearly patentable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicants' undersigned representative.

Respectfully submitted,

Takahiro OHSITA et al.

By:



W. Douglas Mahm
Registration No. 44,142
Attorney for Applicants

WDH/pth
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
May 20, 2002